

PATENT CLAIMS

- 1 Subsea lubricator device, comprising a blowout preventer assembly (40; 140), a tool housing assembly (60; 160) and a sealing assembly (64; 180) for a cable or wire
5 leadthrough, intended to be located at a subsea Christmas tree (10; 100; 200) and having a passage (42, 62) therethrough which communicates with a passage (12, 22) in the Christmas tree,
characterized in that the device comprises at least one bypass (46, 66; 146, 166, 167) providing an additional fluid connection to the passages (12, 22) of the
10 Christmas tree.
2. Device according to claim 1,
characterized in that the bypass is comprised of lower (46; 146, 147) and upper bypass pipes (66; 166, 167) removably connected to each other.
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3. Device according to claim 1 or 2,
characterized in that at least the upper bypass is comprised of two bypass pipes (166, 167).
- 20 4. Device according to claim 1 - 3,
characterized in that the bypass comprises a fluid connection (72; 172, 195) between each of the upper bypass pipes (66; 166, 167) and the passage (62) of the tool housing (63; 163) at the upper end of the tool housing.
- 25 5. Device according to claim 4,
characterized in that the bypass comprises a valve assembly (51) providing fluid connection between the lower bypass pipe (46) and a passage (42) of the blowout preventer (40) at a position below the valves (43, 44) of the blowout preventer.
- 30 6. Device according to claim 4,
characterized in that the bypass comprises a valve assembly (152) providing fluid connection between the lower bypass pipe (146) and the passage (42) in the blowout preventer (40) at a position below the valves (142, 145) of the blowout preventer.
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7. Device according to claim 4,

characterized in that the fluid connection (72) comprises a crossover (74), which comprises connector means (82) for attachment of an external fluid supply source (84, 87).

5 8. Device according to claim 5,

characterized in that the valve assembly (51) comprises a first inlet connected to the first bypass pipe (46), a second inlet (47) connected to an umbilical (30), a first outlet (52) connected to the production passage (12) of the Christmas tree, and a second outlet (53) connected to the annulus passage (22) of the Christmas tree.

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9. Device according to claim 8,

characterized in that check valves (55, 56) are arranged in the inlets.

10. Device according to claim 8,

15 characterized in that a stop valve (53) is arranged in the first outlet (52).

11. Device according to claim 8,

characterized in that a stop valve (57) is arranged in the second outlet (53).

20 12. Device according to claim 7,

characterized in that the valve assembly (51) is a part of an adapter (90; 190; 290)

13 Device according to claim 12,

25 characterized in that the adapter (90; 190; 290) is removably attached to the blowout preventer (40), and comprises a connector device (41) which may be adapted to connector profiles for various Christmas trees (10).

14. Device according to claim 11 or 12,

30 characterized in that the adapter (90; 290) comprises a first passage (91; 294) providing an axial connection between the passage (42) in the blowout preventer (40) and the passage (12) in the Christmas tree (10), and a second passage (92) providing fluid connection between the bypass pipe (46) and the annulus passage (22) in the Christmas tree (10).

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15 Device according to claim 11 or 12,

characterized in that the adapter (190) comprises a first passage (191) providing an axial fluid connection between the passage (42) in the blowout preventer (40) and the annulus passage (22) in the Christmas tree (10), and a second passage (192) providing fluid connection between the bypass (46) and the production passage (192) in the Christmas tree (10).

16 Device according to claim 12, characterized in that the adapter (290) comprises a valve actuator.

17. Method of circulating fluids out of a subsea lubricator (40, 60), said lubricator comprising a blowout preventer assembly (40), a tool housing assembly (60), and a stuffing box (64), intended to be located at a subsea Christmas tree (10) and having a passage (42, 62) therethrough which communicates with a passage (12; 22) in the Christmas tree,

18 characterized in that a fluid is supplied into the lubricator, whereby fluids in the tool housing are displaced into at least one bypass and therefrom into the well, or into a flow line.

19. Method according to claim 17, characterized in that the supplied fluid is water.

20. Method according to claim 17, characterized in that the supplied fluid is a hydrate inhibiting fluid.

21. Method according to claim 19, characterized in that the hydrate inhibiting fluid is methanol or glycol.

22. Method according to claim 17, characterized in that the supplied fluid is a diluent.

23 Method according to claim 17, for removal of water from the tool housing, characterized in that fluids are injected in the following steps:

-a hydrate inhibiting fluid is supplied to the tool housing (63), displacing water therefrom during simultaneous injection of a hydrate inhibiting fluid into the well.

24 Method according to claim 17, for removal of hydrocarbons from the tool housing,

characterized in that the fluids are injected in the following steps:

-at a first stage water, along with a hydrate inhibiting fluid are supplied to the tool housing, displacing hydrocarbons from the tool housing into said at least one bypass,

-at a second stage water is supplied to the tool housing, whereby this is filled with water, and

-simultaneously supply of the hydrate inhibiting fluid in the well, whereby formation of hydrates is prevented when the water is forced into the well.

24. Method according to claim 17, wherein the safety valves (43, 44) of the lubricator are closed while a tool (8) being located in the well,

characterized in that a pipe (84) for external fluid supply (87) is connected to the upper bypass (at 82), whereby fluid under high pressure may be pumped downwardly in the well through the lower bypass (46), whereby the well may be killed.

25. Method of circulating fluids in a well using a lubricator according to claim 1,

characterized in the following steps:

-the tool housing (63; 163) and the upper bypass (66; 166, 167) are disconnected,

-a first supply pipe (85) is connected to the blowout preventer (at 61),

-a second supply pipe (84) is connected to a lower bypass (at 61a; 147), and

-fluid is circulated in the well through the bypass (46; 147), through an annulus passage (22) of the Christmas tree, and down an annulus of the well, and further into the tubing (1), up the production passage (12) of the Christmas tree and the passage (42) of the lubricator, back to the surface.

26. Method of circulating fluids in a well using a lubricator according to claim 1,

characterized in the following steps:

-the tool housing (63; 163) and the upper bypass (66; 166, 167) are disconnected,

-a first supply pipe (85) is connected to the blowout preventer (at 61),

-a second supply pipe (84) is connected to a lower bypass (at 61a; 147), and

-fluid is circulated in the well through the passage (42) of the lubricator and the production passage (12) of the Christmas tree, and further into the tubing (1), up the annulus of the well, the annulus passage (22) of the Christmas tree, through the bypass (46; 147), back to the surface.